

to an off air data stream, and [one or more] at least one stable reference value[s] embedded in said off air data stream [are] is used to generate a pseudo stable reference control.

**REMARKS**

Attached are the marked up versions of the claims and new paragraphs as required in Section 1.121(4) (ii).

The application should now be in condition for examination, which is respectfully requested.

Respectfully Submitted

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New Header to be Inserted on Page 1, before line 1:

**--CROSS-REFERENCE TO RELATED APPLICATION**

This application claims priority to British Patent Application No. 0023267.8 filed 22 September 2000 and British Patent Application No. 0102041.1 filed 26 January 2001.

**BACKGROUND OF THE INVENTION**

**Replacement Paragraph to be Inserted into Page 1**

BDRs typically contain a voltage controlled crystal oscillator (VCXO) generating a local frequency which is usually varied by up to  $\pm 100$ ppm about a nominal frequency, typically 27MHz. Off air Moving Picture Expert Group (MPEG) transport stream/broadcast data streams have stable reference control signals embedded therein which are common to a 90KHz system clock reference (SCR). The microprocessor of a BDR produces a suitable pulse width modulated (PWM) waveform based on the SCR value to control the frequency of the VCXO. An accurate VCXO frequency allows accurate color subcarrier frequency generation, thereby allowing the generation of the final video output.

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## Replacement Paragraph to be Inserted into Page 2

Phase Alternation Line (PAL) decoders in televisions take composite video signals (i.e. video signals containing luminance, color and synchronization pulses which are generated by BDRs) from the video output of BDRs and recover the constituent red, green and blue components for display on the screen of the television or monitor. The PAL decoder in an average television can lock to a color subcarrier frequency generated by the VCXO deviating by up to  $\pm 200\text{Hz}$ . This equates to  $\pm 45\text{ppm}$  about the subcarrier frequency of  $4.43361975\text{MHz}$ . If the free run frequency of the  $27\text{MHz}$  VCXO deviates beyond this point, as it can do when an inaccurate Pulse Width Modulated (PWM) is generated due to the absence of a stable SCR value, it is possible for the PAL decoder to lose color lock. This can result in color loss to the image displayed on the display screen, which is undesirable.

A similar problem is encountered when playing back BDR recordings on a video cassette recorder (VCR), for example if the user is trying to clear hard disk space in the BDR by transferring data onto a VCR. VCR's are less tolerant to errors in color carrier frequency than television systems and can introduce further errors to the recorded SCR. As such, when the recording has been transferred from the BDR to the VCR and the VCR is then played back on the display screen of the television system, the error in the color sub-carrier frequency results in deviations in PWM greater than the PAL decoder of the television can lock onto. This results in color loss of the image displayed on the display screen.

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Header to be inserted into Page 3

## SUMMARY OF THE INVENTION

Paragraph to be Inserted into Page 3:

According to a first aspect of the present invention there is provided a method for the production of a pseudo stable reference control for the reliable generation of composite video signals from a broadcast data receiver (BDR), said BDR receiving video, audio and/or auxiliary data from a broadcaster, said BDR having storage means in which to store data and characterized in that said method includes the steps of said BDR producing a pseudo stable reference by extracting/deriving one or more values from frequency information embedded in incoming broadcast data and using said pseudo stable reference to control the frequency of a VCXO in the BDR, thereby allowing accurate color sub-carrier frequency generation for the generation of a video output via the BDR, or a VCR communicating with said BDR.

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**Replacement Paragraphs to be Inserted into Page 4:**

The phase locked loop software compares the 90KHz stable frequency reference of SCR from the data stream to the local frequency value of the VCXO. The software operates to minimize the difference between the exact count of 90KHz stable clock cycles and the clock cycle count of the BDR local crystal oscillator, and preferably these should be the same. If there is any difference then the software either increases or decreases the VCXO frequency until the local 90KHz counts match those of the incoming data stream.

In one embodiment the pseudo stable reference is the average of the current PWM value, the most recent PWM value stored in the BDR/microprocessor and the oldest PWM value stored in the BDR/microprocessor. The values can be stored in memory in the BDR with the memory being of any suitable non-volatile form such as the Hard Disk Drive memory or Electrically Erasable Programmable Read-Only Memory (EEPROM) memory as both of these types will maintain the data in memory if the power supply is removed.

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Replacement Paragraph to be Inserted into Page 6:

According to a second aspect of the present invention there is provided a broadcast data receiver, said BDR receiving video, audio and/or auxiliary data from a broadcaster, said BDR having storage means in which to store data and characterised in that the BDR is provided with means for producing a pseudo stable reference by deriving/extracting one or more values from frequency information embedded in incoming data, and said pseudo stable reference is used to control the frequency of a VCXO in the BDR, thereby allowing the generation of an accurate sub-color frequency for the playback of stored data from the BDR and/or a VCR.

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Header to be Inserted into Page 7:

**DESCRIPTION OF THE PREFERRED EMBODIMENTS**

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**Replacement Paragraph to be Inserted Into Page 9:**

The pseudo stable reference is then used as the VCXO drive value when playing back data from the hard disk of the BDR. An accurate VCXO value allows the PAL decoder to lock onto the color subcarrier frequency and prevents color loss of the image displayed on the display screen.

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**Replacement Paragraph to be Inserted Into Page 10:**

storage means, the BDR locks onto an off air data stream and derives a pseudo stable reference control value therefrom. This reference is based on the stable clock reference (SCR) embedded in the data stream. The extraction of SCR data is typically performed by the microprocessor in the BDR and the remaining data of the data stream is discounted. The microprocessor uses the derived SCR value to produce a suitable pulse width modulated (PWM) waveform to control the voltage controlled crystal oscillator (VCXO) of the BDR. The color subcarrier frequency generated by the VCXO is then locked onto by the PAL decoder of the television to prevent color loss of the image displayed on the television display screen.

In a similar manner, when digital data is being transferred from the BDR to a video cassette recorder (VCR), the BDR locks onto an off air data stream and derives a pseudo stable reference control based on the stable reference embedded in the off air data stream. The pseudo stable reference control value is then used to set the VCXO of the BDR to ensure that the digital data being copied onto the VCR has an accurate SCR value. This is particularly important as VCR's are less tolerant to errors in color carrier frequency than television systems, and can introduce further errors to the VCR recorded SCR. Thus the pseudo stable reference prevents color loss of images displayed on the television display screen from VCR data, which in turn has been recorded from BDR data.

The BDR records SCR values from off air data streams at pre-determined time intervals and stores these values in storage means of the BDR. In the event that during playback of stored digital data from the BDR, locking of the BDR to the off air data stream is lost, the BDR uses the last recorded SCR to continue playback of stored digital data without any loss of color of the vide output. Once locking of the BDR onto an off

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New Paragraph for Page 11 to be Inserted After the Last Line:

While the invention has been described with a certain degree of particularity, it is manifest that many changes may be made in the details of construction and the arrangement of components without departing from the spirit and scope of this disclosure. It is understood that the invention is not limited to the embodiments set forth herein for purposes of exemplification, but is to be limited only by the scope of the attached claim or claims, including the full range of equivalency to which each element thereof is entitled.

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